

REMARKS

Claims 12, 46 and 47 have been canceled and new claims 48-50 have been added. Claims 1-3, 6, 8, 11, 13, 20, 22, 23, 26, 27, 30, 31, 36, 37, 45 and 48-50 remain in the application. Reconsideration of the application in view of the amendments and the remarks to follow is requested.

Claims 12, 46 and 47 have been withdrawn from consideration as being directed to a non-elected invention. Claims 12, 46 and 47 have been canceled.

Claims 1-3, 6, 8, 11, 13, 20, 22, 23, 26, 27, 30, 31, 36, 37 and 45 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Trabucco, U.S. Patent No. 5,899,737, in view of Sakemi et al., U.S. Patent No. 5,655,704.

The Examiner correctly states that Trabucco does not teach the step of dipping a substrate into a volume of solder balls.

The Examiner also states (p. 4) that "Sakemi teaches the act of dipping a substrate into a volume of multiple solder balls to at least properly position the solder balls on the substrate as well as place individual solder balls in respective pads of the substrate (see Fig. 4). The act of "dipping" is broadly read as placement of the substrate within multiple balls of solder to place solder balls on the substrate." The Examiner is mistaken on multiple grounds.

Sakemi is void of the words "dipping" or "dip". No equivalent term appears anywhere in Sakemi.

Fig. 4 of Sakemi shows a template 4 (col. 6, line 8 et seq.) having holes 4a in groups that correspond to electrodes on the workpiece (col. 3, lines 55-

58). Fig. 4 shows a soldering ball container 12 that is moved over the template 4 to place single solder balls in respective holes. Accordingly, even if "dipping" is broadly read as placement of the substrate within multiple balls of solder, Fig. 4 fails to show, teach, disclose, suggest or motivate any such thing.

Sakemi teaches (col. 1, lines 50-51; col. 3, line 56) a one-to-one correspondence between holes and electrodes. Sakemi further teaches (see col. 1, lines 66-67; col. 2, lines 25-27 and 49-52) that it is important that only one solder ball enter each hole and thus that only one solder ball contact each electrode. Dipping the substrate into a volume of solder balls, as proposed by the Examiner, defeats the main intent of Sakemi.

It is improper to employ a reference in a manner that renders the reference unsuitable for its intended purpose. This is outlined in MPEP §2143.01, entitled "Suggestion or Motivation to Modify the References". This MPEP section states that "THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE". This MPEP section further states that "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)."

Additionally, Applicants note the definition of the word "dip" provided by Merriam-Webster's Collegiate Dictionary, Tenth Ed. (Merriam-Webster, Inc., Springfield MA, copyright 1993) at page 327: "to immerse something into a

processing liquid or finishing material". Equating the recitation in claims 1, 3, 13, 23, 27, 31 and 46 of "dipping the substrate into a volume of the balls of solder" with what is shown in Sakemi's Fig. 4 clearly gives the term "dip" a meaning repugnant to the normal meaning of the term.

MPEP §608.01(o), entitled "Basis for Claim Terminology in Description" clearly states that "The meaning of every term used in any of the claims should be apparent from the descriptive portion of the specification with clear disclosure as to its import; and in mechanical cases, it should be identified in the descriptive portion of the specification by reference to the drawing, designating the part or parts therein to which the term applies. A term used in the claims may be given a special meaning in the description. No term may be given a meaning repugnant to the usual meaning of the term."

Further, MPEP §2111.01, entitled "Plain Meaning" clearly states that "THE WORDS OF A CLAIM MUST BE GIVEN THEIR "PLAIN MEANING" UNLESS THEY ARE DEFINED IN THE SPECIFICATION". MPEP §2111.01 further states that "While the meaning of claims of issued patents are interpreted in light of the specification, prosecution history, prior art and other claims, this is not the mode of claim interpretation to be applied during examination. During examination, the claims must be interpreted as broadly as their terms reasonably allow. This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. In re Zletz, 893 F.2d 319, 321; 13 USPQ2d 1320, 1322 (Fed. Cir. 1989)."

The interpretation that the Examiner has proposed for the teachings of Sakemi is clearly improper and fails to meet the requirements of MPEP §§608.01(o) and 2111.01. Further, the reference fails to show the claim elements it is cited for, and attempting to modify the reference renders the reference unsuitable for its intended purpose. For at least these reasons, the rejection of claims 1, 3, 13, 23, 27 and 31 is improper and should be withdrawn, and claims 1, 3, 13, 23, 27 and 31 should be allowed.

Trabucco teaches a fluxless method of melting solder balls (see, e.g., Title, Abstract, Background, Summary, Detailed Description). It is a main intent of Trabucco to eliminate flux from the soldering process. Trabucco teaches (col. 1, lines 39-49) that disadvantages to using flux include residues left on soldered items and necessitation of extra cleaning steps. Trabucco teaches (col. 2, lines 27-30) that flux use generates additional waste products and that elimination of flux provides economy in manufacturing processes by elimination of cleaning steps and elimination of additional waste products. Trabucco further teaches (col. 4, lines 14-30) that fluxless soldering provides simpler and faster manufacturing, without need for cleaning processes after soldering.

Sakemi, on the other hand, teaches (col. 2, lines 36-43; col. 3, lines 1-4; col. 4, lines 57-59; col. 6, lines 22-26) that flux is desirable. Sakemi teaches that flux can provide advantages such as preventing the solder ball from dislocating from the electrode (col. 6, lines 22-26).

Applicants note the requirements of MPEP §2145, entitled "Consideration of Applicant's Rebuttal Arguments". This MPEP section

states, in subsection (X)(D)(2), entitled "References Cannot Be Combined Where Reference Teaches Away from Their Combination", that "It is improper to combine references where the references teach away from their combination. In re Grasselli, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983).

Accordingly, there is no motivation, as a matter of law, to attempt to combine the teachings of Trabucco with those of Sakemi to try to arrive at the invention as recited in any of Applicant's claims. The rejection of claims 1-3, 6, 8, 11, 13, 20, 22, 23, 26, 27, 30, 31, 36, 37 and 45 should be withdrawn, and claims 1-3, 6, 8, 11, 13, 20, 22, 23, 26, 27, 30, 31, 36, 37 and 45 should be allowed.

Trabucco teaches away from use of a laser beam for melting solder balls. Trabucco explicitly states that a beam of light from a xenon lamp is a preferred light source (see col. 2, lines 20-22; col. 3, line 58 through col. 4, line 2). Trabucco also explicitly states (col. 4, lines 5-8) that "As an alternative, a laser beam could be used, but suffers the disadvantage of being much more difficult to control, and being more likely to thermally shock the contact pad."

X (Trabucco explicitly teaches that lasers are disadvantageous and therefore should not be used. Trabucco also explicitly teaches that use of xenon flashlamps avoids the enumerated deficiencies associated with lasers.

Trabucco teaches away from the invention as recited in any of claims 2, 6, 8, 20, 22, 23, 26, 30, 36 and 37, as well as new claims 48-50, all of which explicitly recite laser bonding of the solder balls. Accordingly, the

rejection of claims 2, 6, 8, 20, 22, 23, 26, 30, 36 and 37 is improper and should be withdrawn, and claims 2, 6, 8, 20, 22, 23, 26, 30, 36 and 37 should be allowed.

Dependent claims 2, 6, 8, 11, 12, 22, 26, 30, 36, 37, 45 and 47 are allowable as depending from allowable base claims and for their own recited features which are neither shown nor suggested by the prior art.

New claims 48-50 are supported by text appearing at p. 4, line 9 through p. 9, line 15 of the specification as originally filed. No new matter is added by new claims 48-50. New claims 48-50 distinguish over the art of record and are allowable.

In view of the foregoing, allowance of claims 1-3, 6, 8, 11-13, 20, 22, 23, 26, 27, 30, 31, 36, 37, 45-47 and 48-50 is requested. The Examiner is requested to phone the undersigned in the event that the next Office Action is one other than a Notice of Allowance. The undersigned is available for telephone consultation at any time during normal business hours (Pacific Time Zone).

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page(s) are captioned "**Version with markings to show changes made.**"

Respectfully submitted,

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Inventor Warren M. Farnworth et al.
Assignee Micron Technology, Inc.
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Priority Examiner D. Tugbang
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Title: Methods of Bonding Solder Balls to Bond Pads on a Substrate

37 CFR § 1.121(b)(1)(iii) AND 37 CFR § 1.121(c)(1)(ii)
FILING REQUIREMENTS TO ACCOMPANY RESPONSE TO
FEBRUARY 27, 2001 OFFICE ACTION PRELIMINARY AMENDMENT TO
ACCOMPANY REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL
FILING

Deletions are bracketed, additions are underlined.

In the Specification

The replacement specification paragraphs incorporate the following amendments. Underlines indicate insertions and [] brackets indicate deletions.

The paragraph beginning on page 9, line 10, and extending through p. 9, line 15 has been amended as follows:

Aspects of the invention enable solder balls to be placed with greater precision and in greater numbers than was previously possible. Such enables throughput to be increased and provides for better integrated circuitry packaging uniformity. In addition, [solders] solder balls can be placed and bonded in greater numbers on fluxless bond pads which can increase throughput by expediting processing.

In the Claims

The claims have been amended as follows. Underlines indicate insertions and [] brackets indicate deletions.

Claims 12, 46, and 47 are canceled without prejudice.

New claims 48-50 are added.